UNMODERATED REMOTE USABILITY TESTING BY EXPERT REVIEWERS: AN ASSESSMENT OF A WEB-APPLICATION FOR SAMPLE DONORS

by

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ABSTRACT

Introduction and Significance:

Usability studies are useful for getting feedback on web-based software applications. This work explores one usability study approach that involves unmoderated remote usability assessment by expert reviewers. The main goal of this work is to help identify usability issues with a new web-based software application, YourGiftGives(YGG), designed to notify biospecimen sample donors of outcomes of studies they participate in or follow. The objectives of this research are:

Objective 1: To explore remote unmoderated usability testing by expert reviewers.

Objective 2: To apply a remote user testing methodology involving expert reviewers to assess a new web-application targeted to biospecimen sample donors.

Objective 3: To identify usability faults and to propose solutions.

Methods:

A literature review was conducted to understand the research done in the field of usability. The focus was on different types of usability studies, especially remote usability testing, and the use of expert reviewers in usability labs for gathering feedback. The use of various platforms for conducting unmoderated usability testing was also researched. As a result of this research, the remote testing platform UserTesting.com was chosen. Expert usability reviewers were also recruited from the available panel of global participants on UserTesting.com. These expert reviewers completed the usability tasks and provided detailed feedback. Following the completion of each task, expert reviewer participants were asked to answer questions about how easy it was to find information (intuitive design), how

easy it was to keep track of where they were in the application (memorability), and their ability to predict what section of the web application had the information they were looking for (ease of learning). Success or failure to complete a task (effectiveness) and the time it took to complete a task (efficiency) were also captured. After the completion of the usability session, expert reviewer participants were asked to complete the 10-item System Usability Scale (SUS) survey of overall usability of the YGG software. A score of 68 is an average usability score. Summary statistics from task-based analyses and SUS survey analyses were then compiled and reported. After analyzing the quantitative data, qualitative data was reviewed informally to identify potential usability issues, and possible solutions to those issues to help improve the user experience of YGG were proposed.

Results:

From June 1, 2018 to June 25, 2018, data was collected from 12 expert reviewers using UserTesting.com, 10 of which were usable for data analysis as the other two participants did not complete the test. Participants could successfully complete most of the tasks except tasks 01, 11, and 14 where at least one user was not able to successfully complete the task.

When assessing memorability of tasks, with the exception of four tasks, users strongly agreed it was easy to remember the location of the task and to find the information they needed to complete the tasks. For each of the four tasks (04, 13, 17, and 18) one user agreed but did not strongly agree. When asked to rate the ease of learning a task, nine (90%) of the users strongly agreed. One user did not strongly agree for both tasks 03 and 13. It was observed that the average time on task was longer for tasks 01, 08, and 06 when compared to the other tasks. Per the results, the SUS survey results indicated that YGG had an average score of

85.8, indicating an above average usability score. Upon informal review of the qualitative data, I identified the following areas that have the potential to improve the overall usability of YGG: (1) Improving home page navigation so that users can find important information more efficiently and effectively, (2) using accurate text in the password section so that users know what they are going to get, (3) dividing categories clearly in the notification preferences section so that users are able to more easily get updates on the studies they are interested in, and (4) keeping the educational material labels consistent so users can find necessary material easily.

Conclusion/Discussion:

Overall, I found that UserTesting.com was an efficient way to recruit expert reviewers to provide usability feedback on the YGG software. In addition, the methodology used for unmoderated remote usability testing was effective to collect usable data for 10 out of 12 recruited expert reviewers. Lastly, task-based analyses highlighted tasks that may be more challenging to the end users. The YGG web portal meets the objective for which it was designed: Users were able to understand and perform the tasks. In this study, we also identified areas where the YGG design could be improved.

ACKNOWLEDGMENTS

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INTRODUCTION

"Without a good user experience, it is unlikely users will use your website or web-based software application. Users have become intolerant and impatient and expect the apps to be simple" (Sreekrishna, 2014). Complex websites with poor user experience cause users to struggle, making them lose interest, which results in the user abandoning the website.

In addition, there is a high correlation between a positive user experience and repeat use of websites and web-based software applications. For example, firms with high Customer Experience Index (CXi) scores have more customers who purchase again, don't switch to competitors, and recommend the company (Schmidt-Subramanian, 2014). Given these findings, the importance and necessity of having a positive user experience is clear. Therefore, the current work investigates usability as a key factor influencing user experience.

The main goal of this work is to use a remote usability testing approach to help identify usability issues with a new web-based software application, YourGiftGives (YGG). YGG was designed to notify biospecimen sample donors of the outcomes of those studies. An easy and intuitive user interface is needed so that donors are not lost due to bad user experience or difficulties using YGG. These reasons motivate work to identify potential usability issues with YGG in this project.

The goal for this thesis is achieved through the following three objectives:

1. Explore UserTesting.com as one service for conducting remote usability testing with expert reviewers;

2. Apply a remote usability testing methodology involving expert reviewers to assess YGG; and
3. Find existing usability faults and propose solutions to enhance the usability of YGG.

1.1 Usability Labs and Remote Unmoderated Testing:

The US Department of Health and Human Services (2004) defines usability as "the measure of the quality of a user's experience when interacting with a product or system – whether a Web site, a software application, mobile technology, or any user-operated device."

Usability studies are conducted to help identify issues that affect the overall user experience of a product or system. Usability refers to the quality of a user's experience when interacting with products or systems, including websites, software, devices, or applications. (Usability.gov)

Some of the benefits of conducting a usability study as listed by the site usability.gov are that one can:

- Learn if participants can complete specified tasks successfully
- Identify how long it takes to complete specified tasks
- Find out how satisfied participants are with your Web site or another product
- Identify changes required to improve user performance and satisfaction
- Analyze the performance to see if it meets your usability objectives

Often, during a usability test, participants will try to complete typical tasks while observers watch, listen, and takes notes. Common goals are to identify usability problems, to collect

qualitative and quantitative data, and determine the participant's satisfaction with the product or system.

There are two different types of usability studies:

1. Lab-based usability study
2. Remote usability study

Lab-based usability studies are conducted as in-person usability studies. Participants are brought into a lab, matched one-on-one with a researcher, and given a set of scenarios that lead to tasks and usage of specific interest within a product or service (Rohrer, 2014).

In contrast, ***remote usability studies*** can be performed remotely based on various factors like participant location, cost, availability of researchers and observers, etc. Usability labs can also be conducted remotely. Within the category of remote usability testing, there are two different types (Rohrer, 2014): moderated remote usability lab studies and unmoderated remote usability lab studies. **Moderated remote usability lab studies** are conducted remotely with the use of tools such as screen-sharing software and remote control capabilities**. Unmoderated remote usability lab studies** are generally made up of trained participants who have video recording and data collection software installed on their own personal devices. They use a website or product while thinking aloud, having their experience recorded for immediate playback.

In general, results indicate that both the lab-based and remote tests capture very similar information about the usability of a product or system. Each approach appears to offer its own advantages and disadvantages in terms of the usability issues it can uncover (Tullis, Fleischman, McNulty, Cianchette, & Bergel, 2002).

2. LITERATURE REVIEW

2.1 Goal of Literature Review:

The goal of the literature review was to survey some of the latest research in the field of usability. The specific focus of this review was on unmoderated remote usability testing involving expert reviewers, given that was the approach used in this research. Findings from this review provided a basis for understanding some of the gaps and challenges to this approach.

2.2 Method:

Three different approaches were used for conducting the literature search:

1. A selection of human computer interaction (HCI)/usability journals. Usability journals provided the latest research done in the field of usability and HCI. Some major journals referred include the *International Journal of Human Computer Interaction*, *ACM Human Computer Interaction*, and others.
2. An iterative keyword search. I used an iterative approach to apply keywords in my literature search. I started with broad usability search terms (e.g., "usability," "HCI"). I then added the more specific keywords relevant to this thesis (e.g., "study participant"). Table 1 shows the final queries from taking this approach.
3. The use of the JHMI library and database search engine (Welch Library). The library provides access to and searches various resources and external databases like PubMed, Compendex, PsycINFO etc. A summary of my literature search results are shown in Table 1.

Table 1. Database Search

Search engine	Final queries	Search documents	Relevant documents
PubMed	Usability and (web or website) and study participant and evaluation. Sort by: Best Match Filters: published in the last 5 years; English	80	4
	: (("Evaluation"[Journal] OR "Evaluation (Lond)"[Journal] OR "evaluation"[All Fields]) AND usability[All Fields] AND website[All Fields] AND study[All Fields] AND participant[All Fields]) AND ("2013/04/07"[PDat] : "2018/04/05"[PDat] AND English[lang])	3	3
Compendex[1]	((remote usability and website and study participant and evaluation) WN ALL) + (2017 OR 2015 OR 2014 OR 2013) WN YR	25	3

[1] Compendex (external link) is one of the most comprehensive bibliographic databases of engineering research.

Once I found the articles and papers that were useful for our research, they were saved and categorized based on the research topic. Topics included: usability studies, remote usability testing, unmoderated studies, remote testing tools/software, and participants in usability studies. Then the important points that were most relevant and helpful to the current study were highlighted and captured in an Excel spreadsheet with proper references.

As a first step, we studied and researched papers and articles related to usability. It provided a high-level framework of research done in this field. Given that this work applied an unmoderated remote testing approach with expert reviewers, I also explored the benefits and drawbacks of this choice through my review of the literature.

2.3 Remote Usability Testing:

Remote usability testing is one of the ways to conduct usability testing. Although traditional usability tests are usually conducted face-to-face with the users, the remote usability testing method is just as effective in identifying usability issues. Apart from that, remote usability testing is also cost-effective, takes less time, and can reach a larger pool of participants (Gardner, 2007).

There are two different ways of conducting a remote usability study: synchronous (moderated) and asynchronous (unmoderated) remote usability testing. Studies have found that there was no statistical significance in the number of usability issues found in moderated vs unmoderated usability testing; however, the participants in asynchronous test were significantly faster in completing the tasks (Alghamdi, Al-Badi, Alroobaea & Mayhew, 2013).

Most of the studies done are with participants recruited for usability labs. These participants are recruited from either the known user base of the product or target users within the general population by various channels such as Craigslist, ad posts, etc. For traditional in-person usability labs it is necessary to find local candidates so that they can come to the lab. With remote usability testing, we have the freedom of choosing candidates from around the globe, which is very useful if the product being tested has a global audience. Moreover, it is easy to recruit for remote usability testing, as such testing provides not only a much larger pool of users but also allows those users the flexibility to participate from their natural working environment or location.

Most of the relevant articles we identified were on the number of participants in usability studies (Katz & Rohrer, 2005; Faulkner, 2003). These studies show how five participants can be used for conducting usability studies and how the number of participants affects the number of issues discovered during usability studies. There has been little research on the difference in feedback during in-person testing as compared to remote testing; however, for the study my search strategy identified, the authors found there was not much difference in the quality of feedback received in these two types of testing (Tullis et al., 2002). In addition, our search strategy found no studies on the impact of participants' expertise when providing detailed feedback on the outcome of usability lab findings.

Regarding participants in a usability study, research has been done primarily on how incentivizing participants might help keep them more engaged and focused during the study (Nielsen, 2003; Krug, 2005; U.S. Department of Health and Human Services, 2014). In summary, studies didn't show any significant difference in the feedback between in-person and remote usability testing and found users to be more engaged when they were incentivized. These were some of the main reasons why we used paid expert reviewers for our usability studies conducted remotely.

Remote testing has been done frequently in a moderated manner with participants completing the tasks as they share their screens with help of collaborating software like WebEx, GoToMeeting, Skype for Business, etc. (Gambrell, 2017). With these types of software you also have the option to view the participant using the video feature of the tool.

Testing done remotely using collaborating software has been proven effective and saves a lot of effort, time, money, and manpower. (Tullis et al., 2002). Not much research is

available on unmoderated remote testing using various available online platforms (like UserTesting.com, UserZoom.com, etc.) with expert reviewers as participants. The few articles available were about the remote testing tools or benefits of unmoderated testing (Lee, 2017) but none talked about remote unmoderated testing using expert reviewers.

2.4 Summary of gaps that this work helps address:

The literature review was focused on unmoderated remote testing involving expert reviewers. Most of the research I identified discussed the use and benefits of remote usability testing. There was little research on usability testing involving expert reviewers, however. The research reported here performed unmoderated remote usability testing with expert reviewers and thus adds to the small number of published studies that use this approach.

3. METHODS

3.1 Unmoderated Remote Usability Study:

This study uses an unmoderated remote usability testing approach. Some of the important benefits of unmoderated remote tests include that they are cost effective, they allow for quick recruitment of users, there is no need for researchers and observers to be present during the study, and users can complete the tests in their natural environment. Benefits and downsides described by Cao (2017) are summarized below.

Benefits

- **Convenience --** Free from scheduling concerns and limited manpower, unmoderated tests allow you to test users simultaneously and at all hours. This means more data in a quicker time period.

- **Less chance of bias** – While the observer effect shouldn't be the *only* factor, it – and several other types of social and technical biases – are still relevant factors. The absence of a moderator will give participants a more natural environment and thus more results that are free of bias due to the observer effect.

- **Cost-effective –** Unmoderated tests are conducted remotely usually with the help of remote usability testing platforms. You may be able to save money and resources by using this type of platform as there is no need to reserve a facility or a lab. Costs to recruit and pay participants may also be higher in order for study participants to

be present in person. Researchers and observers would also need to be present in this case.

- **Easier recruitment** – The flexible and relaxed environment for unmoderated tests creates a larger pool of willing candidates. Unmoderated tests can be done virtually anywhere at any time by anyone who meets your criteria.

Downsides

- **No follow-up questions** – While you can include forms for open-ended questions to users you don't get to probe why users behave the way they do in some cases.

- **Less forgiving tasks** – Because it's up to the user (and not a moderator) to decide when a task is complete, users may move on to the next task prematurely. That's why you must write clear tasks with a well-defined description of what constitutes a success and failure to complete each task.

- **More time spent filtering for quality** – While moderated testing may introduce some bias, unmoderated testing runs the risk of recruiting users that are motivated purely by the compensation. While it may be possible to spend less time recruiting users, you will need to spend more time filtering to get the right candidates.

We chose unmoderated usability testing approach for this research effort because of the convenience and cost benefits. With a limited budget and time constraints this approach was very effective and hence chosen for testing. A remote usability testing platform provided the ability to recruit participants from various parts of the United States who were

from the general population but also vetted, and thus considered expert reviewers. As our research was focused on using expert reviewers as our participants for gathering feedback, the unmoderated remote testing platform UserTesting.com was the platform chosen to recruit expert reviewers and to conduct unmoderated remote usability tests.

3.2 Measures of Usability Applied in this Work:

Qualitative and Quantitative Data: There are a number of different metrics that can be collected to measure a user's experience with software or a website. Both quantitative and qualitative data can help with understanding what tasks users have issues with, what problems they are facing, and areas where the user experience can be improved.

Qualitative data is most often collected by in-person observers or remote recorders from listening, observing, and asking questions about the user behavior while the user is completing specific tasks. During in-person observations or recording remotely, it is common to use the "think aloud" method (Someren, Barnard, & Sandberg, 1994) where the user verbalizes what he is doing so that observers and the researcher can understand what the user is thinking when completing the tasks.

For quantitative data, there are number of metrics that can be collected to help measure the user experience of the website. Some of the important metrics that can give an indication as to which tasks users are struggling with are measurements of task success, task time, error rate while completing the tasks, user satisfaction and overall usability with instruments such as the System Usability Scale (SUS).

Data collected can be supported with demographic data to help identify patterns or trends among user groups.

Task-based metrics. For this study, the following task-based metrics were measured and collected:

1. **Task Success:** Nielsen (2001) describes task success as the percentage of tasks that users complete correctly. According to him, if users can't accomplish their target task, all else is irrelevant. User success is the bottom line of usability.

Task success is an easy-to-measure metric which helps us capture one of the most important aspects of usability: Are the users able to successfully complete the tasks?

2. **Task Time**: Total task duration will help measure efficiency by recording the time taken to complete the complete a task in minutes or seconds. The task time begins when the user starts his task and ends when the user have finished all the actions and is about to move to the next task. Task time will be used to measure the efficiency of website use in our study (i.e., how fast a user can accomplish tasks).

3. **Task Level Satisfaction**: After the end of each task, questions can be asked to gather feedback on how difficult the task was. Task level satisfaction metrics will immediately flag a difficult task, especially when compared to other tasks. Specific questions align with factors including:

- **Intuitive design**: a nearly effortless understanding of the architecture and navigation of the site.
- **Ease of learning**: how fast a user who has never seen the user interface before can accomplish basic tasks.
- **Memorability**: after visiting the site, if a user can remember enough to use it effectively in future visits.

4**. Overall Usability Rating – System Usability Scale:** At the end of the usability test, often participants provide feedback on the overall usability of the software or website being tested. The System Usability Scale (SUS) was used in this study to gather feedback on the overall usability of the software under review.

SUS was developed by John Brooke in 1986 as a quick way to measure usability. It is generally used after the participant has had an opportunity to use the system being evaluated but before any debriefing or discussions. The SUS is a simple, 10-item scale giving a global view of subjective assessments of usability. SUS yields a single number representing a composite measure of the overall usability of the system being studied. The individual item scores are not meaningful on their own.

To calculate the SUS score, first sum the score contributions from each item. Each item's score contribution will range from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value of SUS. (Brooke, 1986). SUS scores have a range of 0 to 100. Based on research, a SUS score of 68 and above would be considered above average and anything below 68 is below average.

3.3. Participants – Usability Testing with Expert Reviewers

UserTesting.com

Unmoderated remote usability lab study sessions require a more complex platform than moderated remote sessions, for which online-meeting software such as WebEx or GoToMeeting is enough. For unmoderated user testing, a researcher needs an application that plays the role of a session facilitator: It guides the participants through the session and

records what happens. The researcher then can analyze the recordings and collect feedback from the user by adding questions after each task. For this study, UserTesting.com was used for remote unmoderated testing. Our selection of this tool is justified by its support of the following requirements discussed by Nielsen's guidelines (2014) for selecting the online tool for remote usability testing: (1) display and audio recording; (2) participant panel or your own recruitment panel; (3) write your own set of tasks; (4) can test anything: mobile, desktop, prototype, website, app; (5) same day result. UserTesting.com fulfilled the above-mentioned functionality. The case studies on UserTesting.com also demonstrated how others have used this platform successfully to conduct user tests and had provided positive reviews about the platform.

Expert Reviewers

In this project, UserTesting.com also provided access to expert reviewers and mechanisms to recruit them to participate in our usability study. The reviewers were from the general population but had been carefully selected, vetted, and continuously rated based on the feedback they provide. They are recognized by the company to be very detailed-oriented in giving their feedback and in following instructions well. These characteristics helped to ensure that high quality data to discover usability issues was collected. Apart from that, by using UserTesting.com we had the ability to recruit participants with expertise in specific areas such as device or Web expertise. A summary of the benefits and limitations to using expert reviewers follows below.

Benefits of expert reviewers: (UserTesting.com)

- Experts in providing usability feedback
- Detailed-oriented
- Experienced in participating in usability labs
- Follow instructions well
- Continuously rated by other customers to maintain high quality of participants.

Limitations of expert reviewers:

- High cost
- Limited number of participants
- Not enough background or domain knowledge

3.4 About the YourGiftGives web portal – a web application for sample donors

The YourGiftGives (YGG) web portal was developed as part of an initiative led by Dr. Casey Overby Taylor (Assistant Professor, Johns Hopkins University) that aims to build trust in research through providing donors with more transparency and control after donating their biospecimen samples and clinical information. The design of the YGG web portal was informed by findings from previous survey studies (Overby et al., 2015, Shah & Overby, 2017). In summary, that work found that donors would be more willing to participate in research with opportunities to be updated (Overby et al., 2015), and communication preferences for those updates vary (Shah & Overby 2017). With the goal of enabling improved communication with sample donors, the YGG web portal includes functionality for tailoring the types of updates (e.g., major findings from research), frequency of updates

(e.g., annually), and mechanisms to receive updates (e.g., by email). Major functions of the YGG web portal were characterized in my hierarchical task analysis.

3.5 Hierarchical Task Analysis of the YourGiftGives Web Portal

The first step in preparing to test the usability of the YourGiftGives (YGG) web portal was to perform a hierarchical task analysis. This analysis was performed to gain familiarity with the YGG web portal and to define task and subtasks that could be performed. Hierarchical task analysis helps break down tasks into subtasks to show the relationship between the primary task and its subtask through a numbering scheme. Major tasks identified through this analysis were then used to define usability tasks within UserTesting.com.

Hierarchical task analysis involved identifying in a top-down fashion the overall goal of a task, then the various subtasks and the conditions under which they should be carried out to achieve that goal. Figure 1 and Figure 2 below describe results from the hierarchical task analysis of YGG web portal.

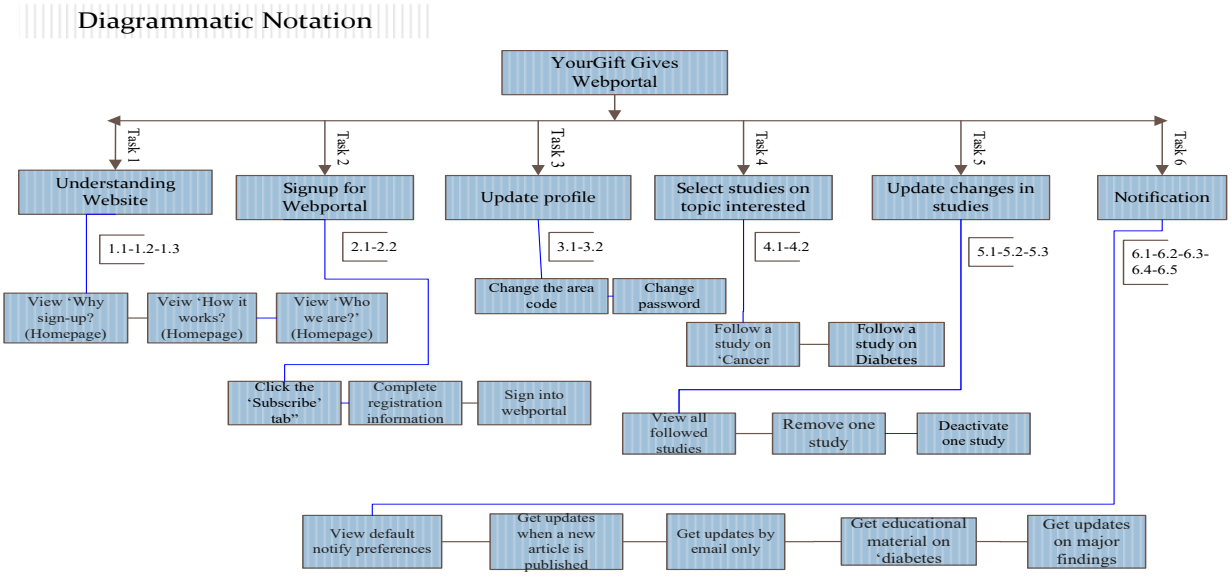

Figure 1. YGG work breakdown analysis

YGG Tasks
1.1 View "Why sign up?" section of the homepage
1.1.1 View "How it works" section of the homepage
1.1.2 View "Who we are" section of the homepage
1.2 Sign up for Web portal
1.2.1 Click the "Subscribe" tab
1.2.2 Complete registration information
1.2.3 Sign into Web portal
1.3 Update your profile
1.3.1 Change the area code
1.3.2. Change the password
1.3.3. Re-verify the new password
1.4 Choose studies on a topic of your interest
1.4.1 Follow a study on cancer
1.4.2 Follow a study on diabetes
1.5 Update changes in studies
1.5.1 View all followed studies
1.5.2 Remove one study
1.5.3 Deactivate one study
1.6 Notification
1.6.1 View default notify preferences
1.6.2 Get updates when a new article is published
1.6.3 Get updates by email only
1.6.4 Get educational materials on diabetes
1.6.5 Get updates on major findings

Figure 2. YGG task and subtask breakdown

3.6. Develop a test plan:

The second step in preparing to test the usability of the YGG web portal was to develop a test plan. We used the template from UserTesting.com to create the study plan ("Plan Your UserTesting Study," 2018). The purpose of the plan was to document the goal, the tasks for user testers to perform, the steps to perform the tasks, the metrics to be captured for tasks, and the number and characteristics of participants to test.

3.6.1 Study test plan

- **Objective:** The objective of the usability test is to find existing usability faults with the YGG web portal. Findings will help to identify any user experience issues relating to content, design, and performance of the web portal.
- **Who:** Only the participants who met the following criteria were invited to complete the usability test of the YGG web portal.

  Age: 18+

  Household Income: Any

  Gender: Any

  Country: United States

  States: Any

  Web Expertise: Any

  Operating Systems: Any

  Web Browsers: Any

  Social Networks: Any
- **What:** Major functionalities supported by the YGG web portal and described in the hierarchical task analysis were tested. Users were asked to "think aloud" as they completed each task using the UserTesting.com platform. They were also asked to answer questions following each task and to complete a survey to assess the overall usability of the YGG web portal at the end of the usability session.
- **How:** The UserTesting.com unmoderated usability testing platform was used to recruit expert reviewers according to the specified criteria and to conduct the usability assessments.

Summary of steps for setting up the remote UserTesting study:

The following steps described by UserTesting.com ("How to Launch a Prototype Study," 2018) were completed to set up remote user testing: (1) logged onto the dashboard, (2) created a new study, (3) selected unmoderated remote usability test (recorded test) as the type of study to conduct, (4) chose to recruit participants by UserTesting Panel, (5) chose the target audience by selecting the demographics, (6) selected tasks according to findings from performing task-based analyses of the YGG web portal, (7) added written instructions for UserTesting.com expert reviewers to follow, and (8) reviewed and launched the study.

The usability assessment was conducted remotely. Upon launching the study, the UserTesting Screen Recorder was used to record the computer screens and the voices of user testers as they completed the task scenarios (see "Task Scenarios" document). Video of the user testers themselves was not captured.

3.6.2. Recruiting Expert Reviewers in UserTesting.com

UserTesting.com provides access to a panel of diverse expert reviewers (See Figure 3 for a summary of panel demographics).

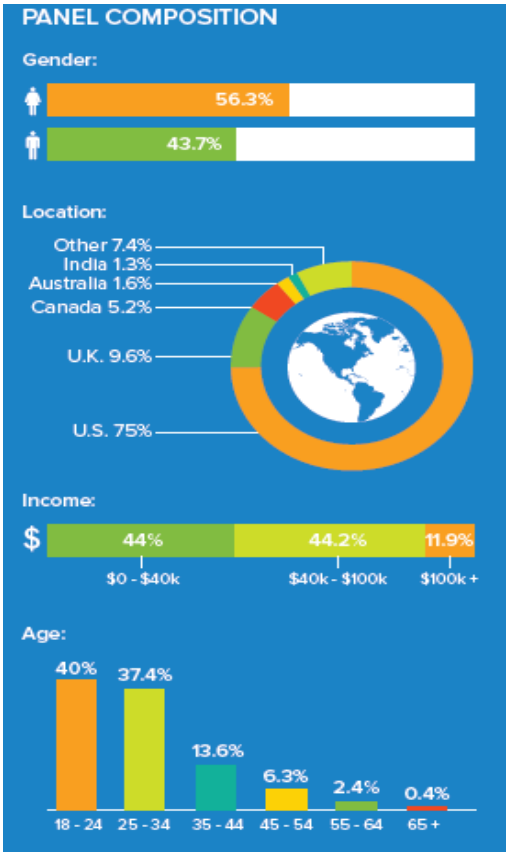

Figure 3. Participant panel composition (UserTesting.com)

3.6.3. Setting Tasks and Launch Study

Setting Tasks

After completing the hierarchical task analysis of the YGG web portal, the primary tasks were used to define tasks for the usability study. These tasks were set up in UserTesting.com where participants would be completing them and providing feedback. Following the completion of each task, participants would be answering questions related to intuitiveness, ease of learning, and memorability.

Participants were provided instructions on how to get started and what tasks needed to be completed. With the help of UserTesting.com we captured the screen as participants

completed the tasks to help us with the analysis. Also, participants were encouraged to talk out loud to help us understand what they were thinking while completing the tasks.

Launch Study

After creating the study, I conducted a dry run with team members to gather feedback on difficulties in completing the study. Any issues encountered were revised prior to launching on the UserTesting.com platform. Next, two pilot tests were performed with two expert reviewers recruited using the UserTesting.com platform. Final changes were then made to address minor issues encountered. Ten expert reviewers were then recruited to complete the final version of the usability test. The video recordings and data were collected, downloaded from UserTesting.com, and stored on a secure server (JHBox). These data were then reviewed and analyzed.

3.7. Data Analyses

Task-based analyses

There were 19 tasks that users performed during the usability study. Quantitative data was analyzed for each task. Time on task was analyzed by calculating the geometric mean in order to get the most accurate representation of average time taken to complete each task. (Sauro & Lewis, 2010). Following the completion of each task, three 5-point Likert scale questions were used to assess task intuitiveness, easy of learning, and task memorability (see Appendix 2). The question answers ranged from 1 (strongly disagree) to 5 (strongly agree). For each task the mean answer across all study participants was reported. An informal review of qualitative data was used to provide insight into findings from analyzing the quantitative question data for each task. Quotes reflecting problems and recommendations made by study

participants to address those problems were included. Quotes highlighting positive aspects of the software were not included but are reflected in the qualitative data only.

System Usability Scale Score Analyses

The System Usability Scale was used to measure the usability of a website or products. According to Brooke (1986), in order to calculate the SUS score the score contributions from each item are added. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2, 4, 6, 8, and 10, the contribution is 5 minus the scale position. You will get values from 0 to 4. Multiply the sum of the scores by 2.5 to obtain the overall value of SUS which has a range from 0 to 100.

SUS = ((q1-1)+(5-q2)+(q3-1)+(5-q4)+(q5-1)+(5-q6)+(q7-1)+(5-q8)+(q9-1)+(5-q10))*2.5

q: individual task rating

The industry average SUS score is 68. A SUS score above that score is considered above average. The graph below shows how the percentile ranks associate with SUS scores and letter grades. A raw SUS score of a 74 converts to a percentile rank of 70%. An SUS score of 74 means the product has higher perceived usability than 70% of all products tested. It can be interpreted as a grade of a B-. Scores above an 80.3 get an A, which represents the top 10% of scores. (Sauro, 2011)

4.RESULTS

4.1. Study participants

In this usability study, 10 expert reviewers from UserTesting.com panelists participated and gave feedback on various tasks designed to interact with the web application for sample donors (the YGG software). All participants were from the United States and above 18 years of age, per our screening criteria.

4.2. Overall Data Analysis

Two types of data were collected during the usability test: qualitative and quantitative data. For qualitative data users were asked some post-study questions and asked to think aloud when completing the tasks. Audio was recorded and reviewed informally to capture areas where users were struggling. A formal analysis of the qualitative data was outside the scope of this thesis. For quantitative data, task success, time on task, intuitiveness, memorability, and learnability were measured.

Overall Task Success

Participants successfully completed most of the tasks (see Figure 4). The tasks where all users could successfully complete the tasks were Task 04, 09, 10, 12 13, 15, 17, 18 and 19. The tasks are analyzed in detail in later section.

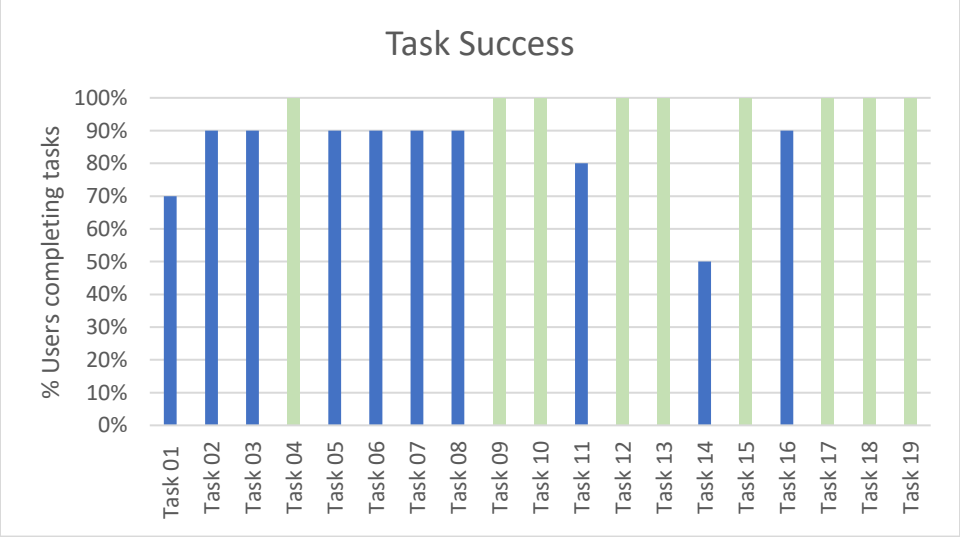

Figure 4. Task Success Chart
See Appendix 3 for criteria for task success.

Overall Time on Task

Time on task was captured to measure the time taken by users to complete each task (see Figure 5). The users took on average of 40.26 secs to complete the tasks during the usability study.

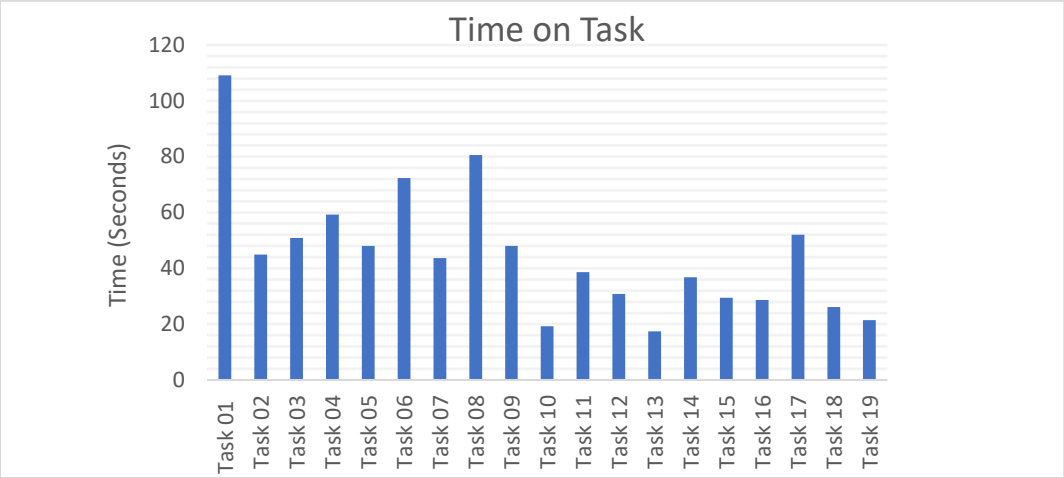

Figure 5. Time on Task Chart
See Appendix 3 for criteria for task success.

Overall Task Intuitiveness

Task intuitiveness is the interaction process between users and a system that relies on a user's intuition (Naumann et al., 2007). Users found most of the tasks to be intuitive, the average of all tasks intuitiveness rating being 4.9, which indicated users found strongly agreed with tasks being intuitive.

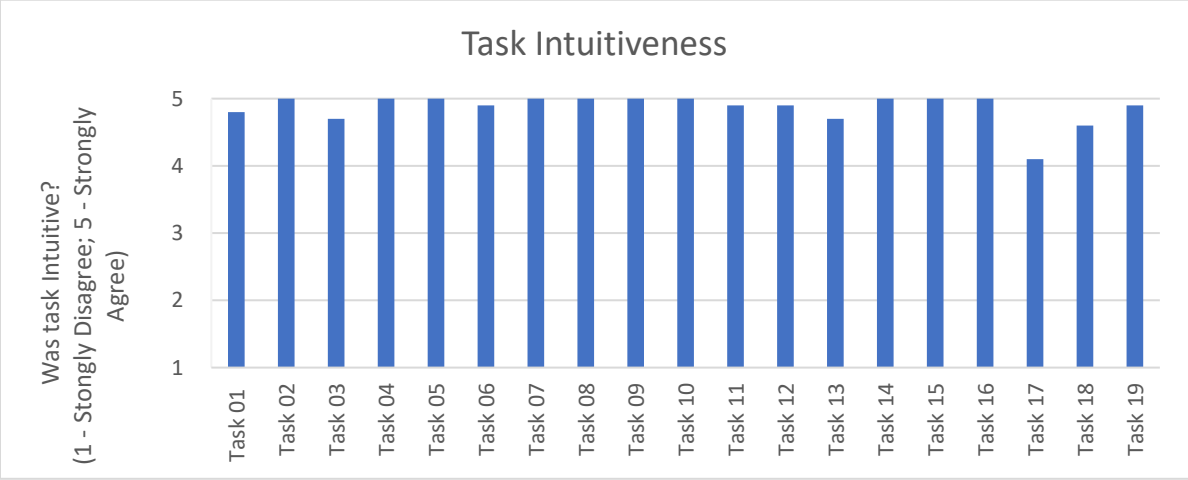

Figure 6. Task Intuitiveness
See Appendix 3 for criteria for task success.

Overall Ease of Learning

The ease with which a participant can remember where he was on the site and where he needs to go to complete the tasks as quickly as possible and without any difficulty was measured. For all tasks, users strongly agreed that they were easy to learn and gave an average rating of 4.95 out of 5.

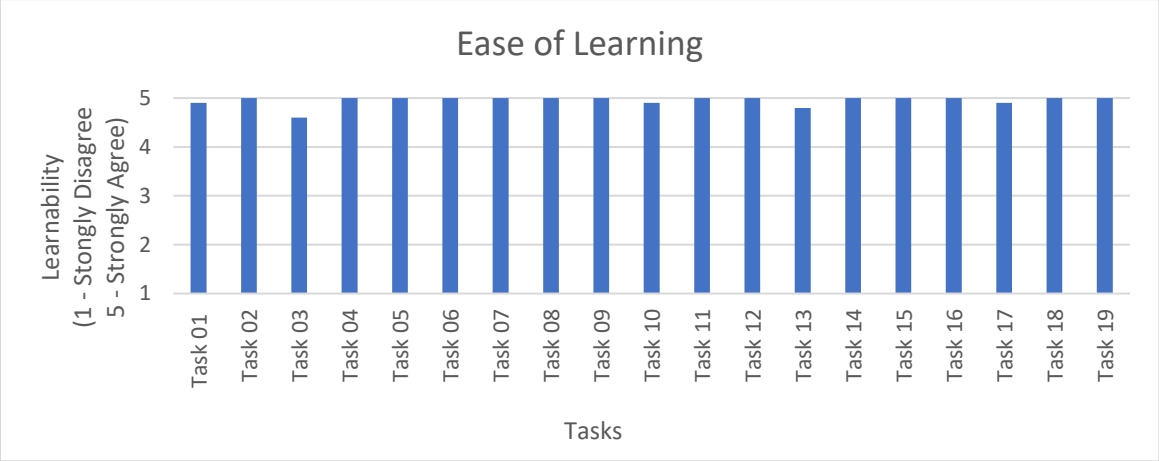

Figure 7. Ease of Learning
See Appendix 3 for criteria for task success.

Overall Task Memorability

Participants gave an average rating of 4.8 for task memorability. Most participants strongly agreed that it was easy to find information they needed to complete the tasks.

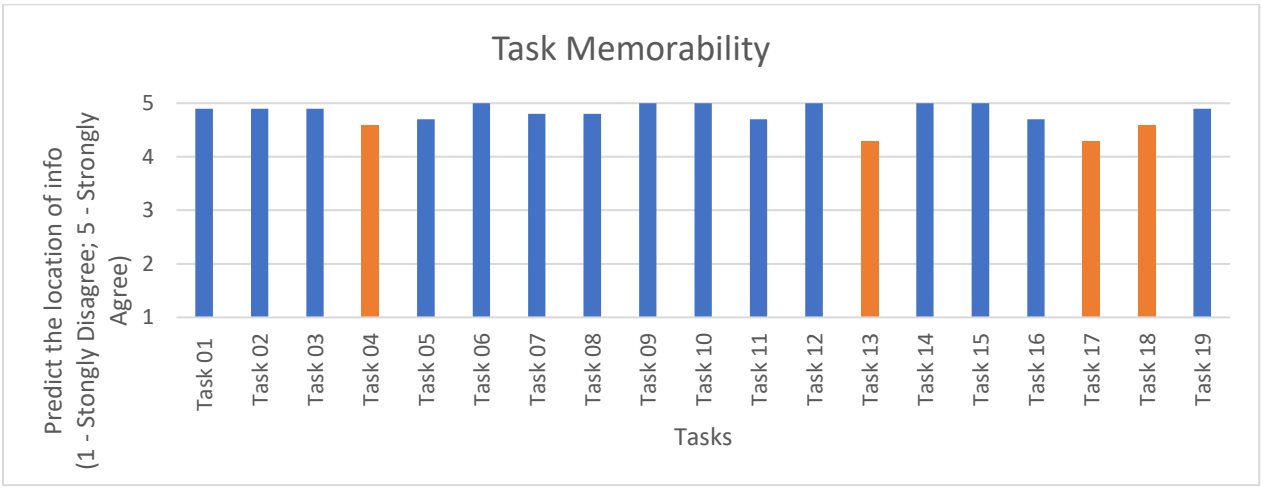

Figure 8. Task Memorability
See Appendix 3 for criteria for task success.

Overall SUS score:

The System Usability Scale was used to measure the usability of a website or products. The average SUS score for the YGG web portal was 85.8, which demonstrated a high usability rating (an SUS grade of A). This finding indicates that this software was considered by study participants to have a higher perceived usability than 90% of industry SUS scores.

Table 2. System Usability Score

Participant	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
P01	5	1	5	1	5	2	5	1	5	1	**97.5**
P02	3	1	5	1	5	1	5	1	5	1	**95.0**
P03	5	1	5	1	5	1	4	2	4	1	**92.5**
P04	5	5	5	5	5	5	5	5	5	5	**50.0**
P05	4	1	5	1	5	1	5	1	5	1	**97.5**
P06	5	4	5	2	4	2	3	2	3	2	**70.0**
P07	5	5	5	2	4	2	5	1	5	1	**82.5**
P08	4	4	4	1	4	1	4	1	4	1	**80.0**
P09	5	1	5	1	5	1	5	1	5	1	**100.0**
P10	3	1	5	1	5	1	4	1	5	1	**92.5**
										Avg	**85.8**

4.3 Individual Task Analysis

Individual task data and feedback was captured in order to understand issues and areas where users are struggling.

Task 01: You are on the YourGiftGives (YGG) web portal homepage. View information on the "Why sign up?" section of the homepage and provide feedback.

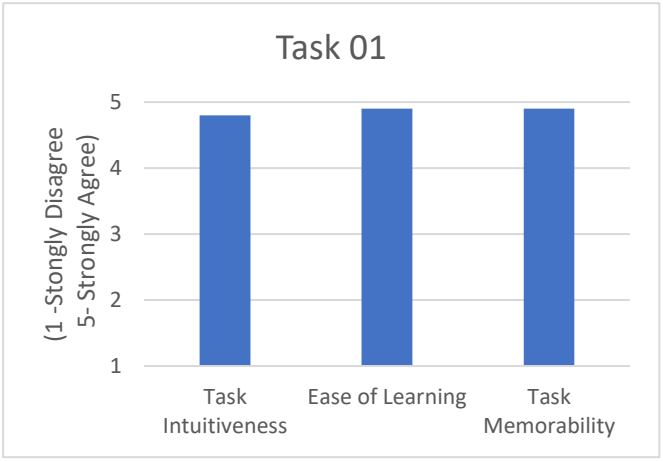

Figure 9. Task 01

Overall Average:

Task Intuitiveness: 4.8

Ease of Learning: 4.9

Task Memorability: 4.9

Users were easily able to locate the "Why sign up?" section. The majority of participants found the task to be intuitive and easy to complete.

Time on Task: The time taken to complete this task was higher than other tasks. It took an average of 109 seconds to complete this task as compared to the overall average of 40 seconds. The higher task time was expected given that users were required to review the homepage and provide feedback on the content of the section. Some users spent more time getting familiar with the homepage as this was their first task and then provided feedback, which may have increased the task completion times.

Task 02: You are on the YourGiftGives (YGG) web portal homepage. View information on the "How it works" section of the homepage and provide feedback.

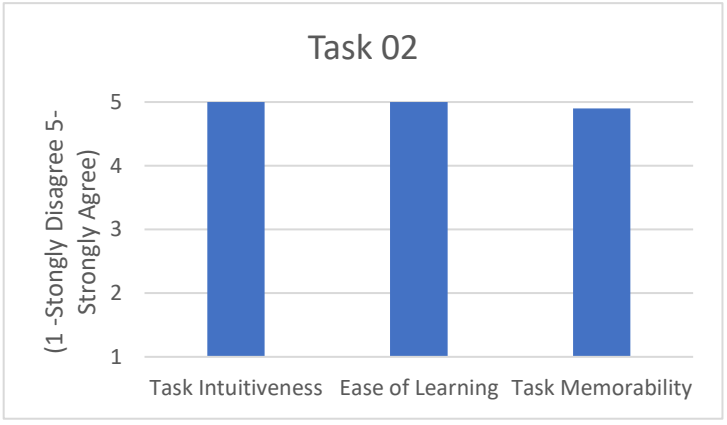

Figure 10. Task 02

Overall Average:

Task Intuitiveness 5.0

Ease of Learning 5.0

Task Memorability 4.9

Users found this task easy and intuitive. Most users found the information where they expected it.

Task Time: Participants took on average around 44 seconds to complete the task. The most time taken was 100 seconds and the least time taken to complete the task was 21 seconds. One suggestion to make it easier and improve task time was to make the icons clickable.

Task 03: You are on the YourGiftGives (YGG) web portal homepage. View information on "Who we are" section of the homepage and provide feedback.

Overall
Task Intuitiveness 4.7
Ease of Learning 4.6
Task Memorability 4.9

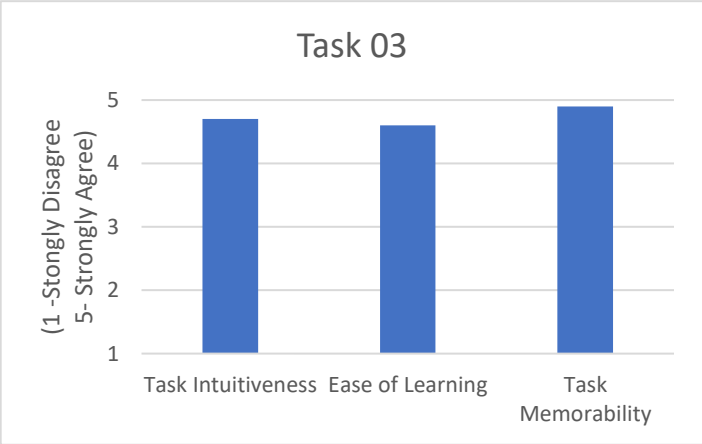

Figure 11. Task 03

Participants rated the learnability of this task lower at 4.6 as compared to first two similar tasks where the average was 5.0 and 4.9. This was clear from the comments where some participants suggested adding pictures with names to make information easier to consume and others felt a lot of information was present and there was a lot of info to read.

Time on Task

Users required on average 51 seconds to complete this task.

Task 04: Log into the YGG web portal using the information provided.

Overall
Task Intuitiveness: 5.0
Ease of Learning: 5.0
Task Memorability: 4.6

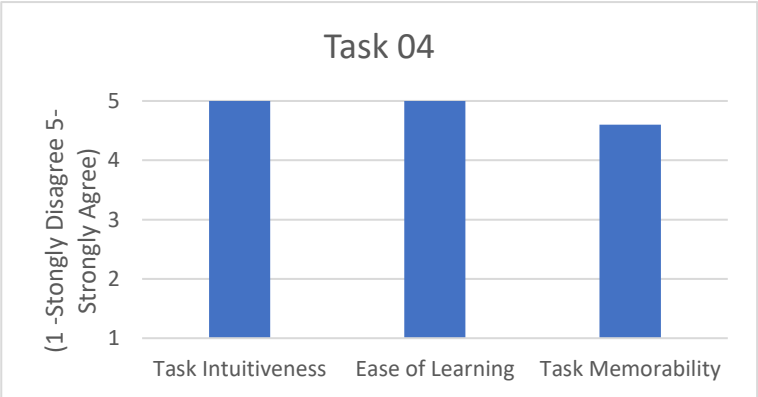

Figure 12. Task 04

Time on Task
Participants required on average 59 secs to complete this task.

The participants rated an average of 4.6 in terms of task memorability which might be because some users were struggling with the password section. In fact, some users suggested creating a separate password section.

Task 05: Update your profile by changing the area code to 21212 using the web portal.

Task Intuitiveness: 5.0
Ease of Learning: 5.0
Task Memorability: 4.7

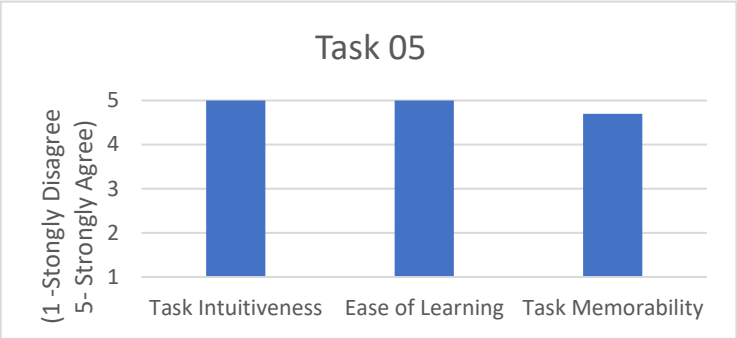

Figure 13. Task 05

Time on Task
Participants required on average 48 seconds to complete this task.

Participants could change the area code without issues and gave a high rating for intuitiveness, learning and memorability.

Task 06: Change the password of the Web portal. How would you do that?

Task Intuitiveness: 4.9
Ease of Learning: 5.0
Task Memorability: 5.0

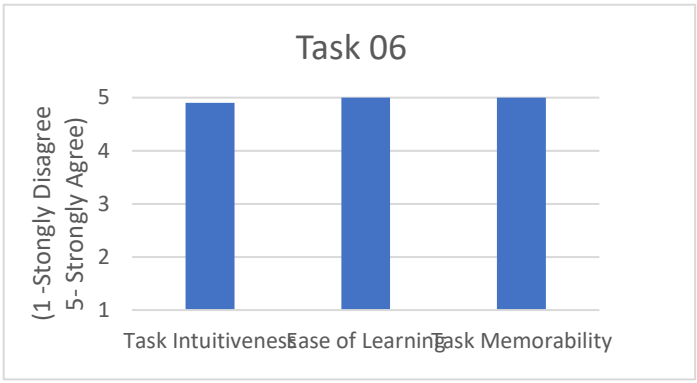

Figure 14. Task 06

Time on Task
Participants required on average 72.31 seconds to complete this task.

The task time was more than the average of all task times (40.26 seconds) because some users found the wording confusing and took a couple of tries before changing the password.

Here are some comments from participants:

"The arrangement and the wording seem to be confusing. It should use labels as 'old password' and 'new password' instead of 'password,' or you can put [the] old password on [the] left and [the] new password on [the] right side." [Participant 1]

"[The] old password is at the bottom [of the new password section]. I suggest [putting] the label 'new password' instead of 'password' to reduce confusion and frustration." [Participant 8]

Task 07: Re-verify whether you can successfully log into your YGG account using new password.

Task Intuitiveness: 5
Ease of Learning: 5
Task Memorability: 4.8

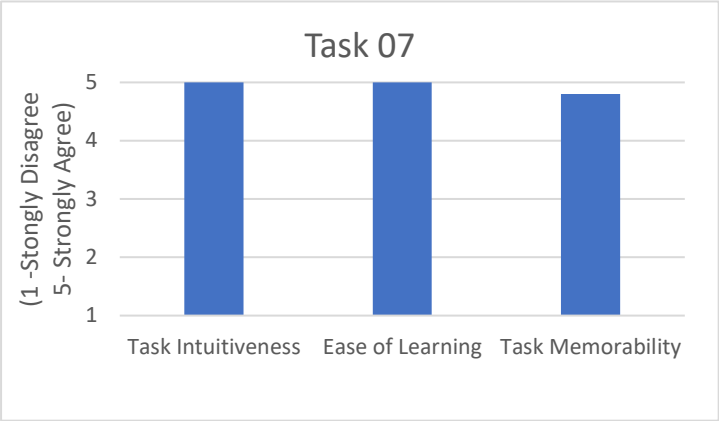

Figure 15. Task 07

Time on Task
Users required on average 43.705 seconds to complete this task.

Participants were successfully able to log in using the new password and with an average task time of 43.7 seconds, which might be since they had already performed a similar login task for their YGG account.

Task 08: Follow a study on cancer using the Web portal. Describe and perform the steps to follow the study.

Task Intuitiveness: 5
Ease of Learning: 5
Task Memorability: 4.8

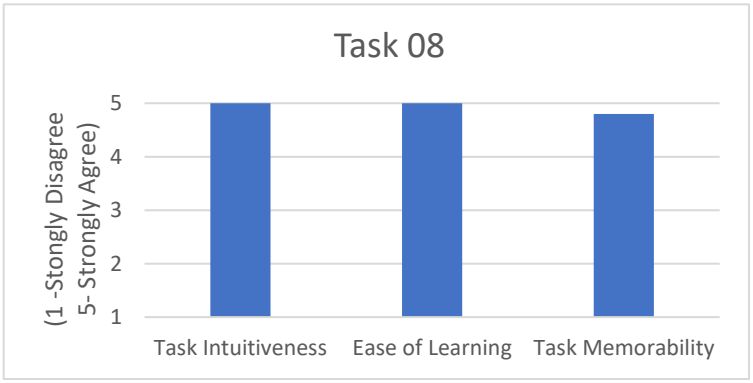

Figure 16. Task 08

Time on Task
Participants required on average 80.61 seconds to complete this task.

Participants took more time than average on this task as users were confused with the "Follow study" task. The comments by participants below help us understand why some of them were confused. Some of the reasons were the checkbox not being labelled and the followed studies not being added quickly.

"The follow studies are not adding quickly so it might be confusing to someone." [Participant 1]

"It would be nice to label the checkbox in 'Follow studies.' That will be [an] improvement because some of them may not know what that checkbox means." [Participant 6]

"I was confused because there was no label when I clicked on the link" [Participant 10]

Task 09: Follow a study on diabetes using the Web portal. Describe and perform the steps to follow the study.

Task Intuitiveness: 5
Ease of Learning: 5
Task Memorability: 5

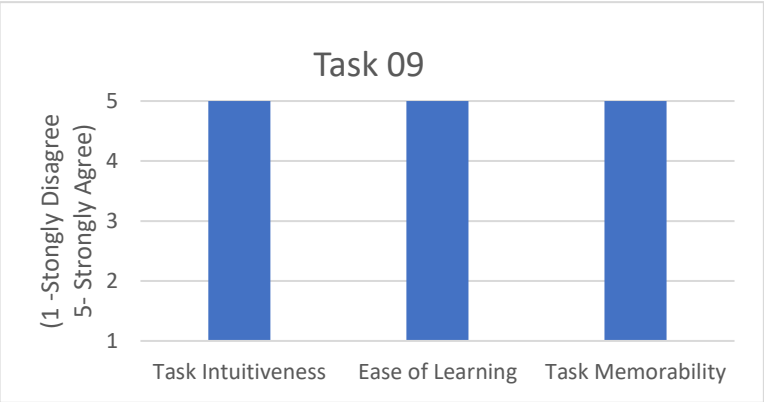

Figure 17. Task 09

Time on Task
Users required on average 47.97 seconds to complete this task.

Participants were able to complete this task quickly compared to the previous task, likely because the previous task had created a level of familiarity.

Task 10: View the list of studies you are following on the YGG Web portal.

Task Intuitiveness: 5.0
Ease of Learning: 4.9
Task Memorability: 5.0

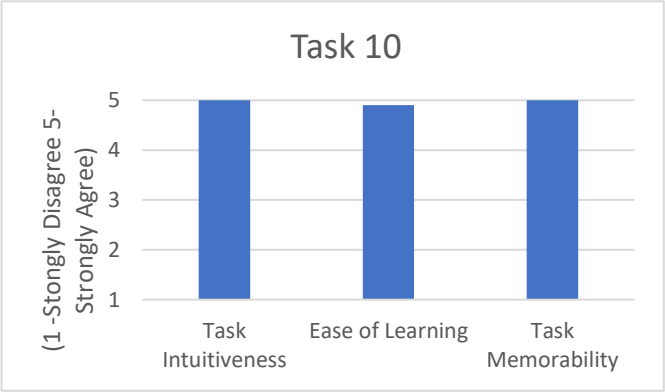

Figure 18. Task 10

Time on Task
Participants required on average 19.23 seconds to complete this task.

Participants found it is easy to keep the track of studies which they were following, based on the fact that it took a lot less time than the average task time to complete the task.

Task 11: View the full study description of the followed studies on diabetes.

Task Intuitiveness: 4.9
Ease of Learning: 5.0
Task Memorability: 4.7

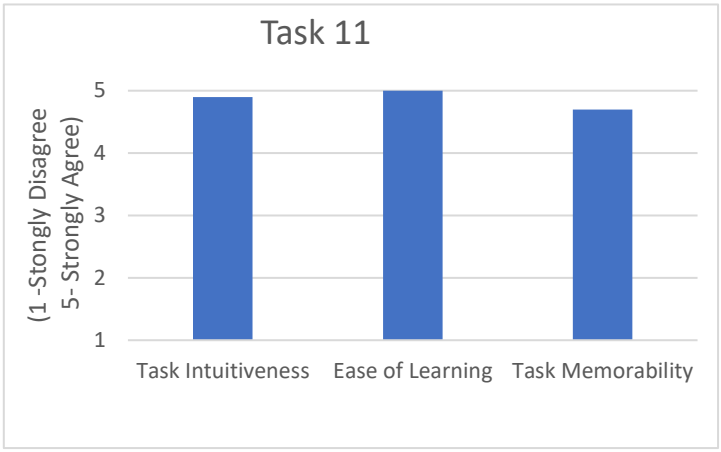

Figure 19. Task 11

Time on Task

Participant required on average 38.62 seconds to complete this task.

This task took more time than "View the list of studies" as users found the task not very clear and sometimes confusing, as evident in the comment below.

"It was not immediate[ly] clear on how to follow but [I] was able to find out using trial and errors." [Participant 8]

Task 12: Remove the cancer study that you are following on the YGG Web portal.

Task Intuitiveness: 4.9
Ease of Learning: 5.0
Task Memorability: 5.0

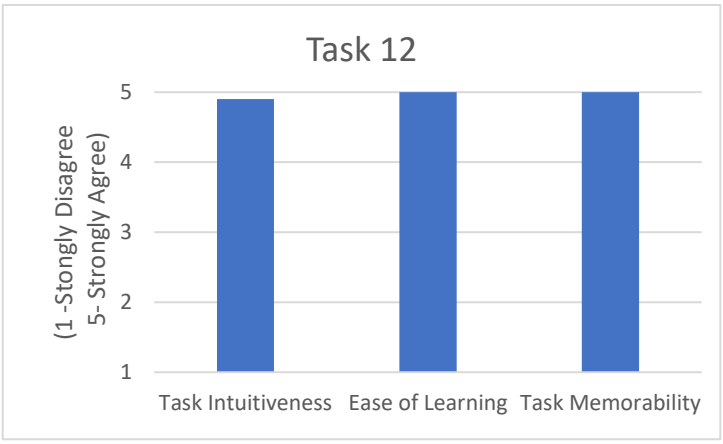

Figure 20. Task 12

Time on Task

Users required on average 30.7 seconds to complete this task.

Participants took more time with deleting the study task than with the task of deactivating it.

It might be because some of the users were confused with the word "delete" for removing the study as they expected a remove or unfollow button, as stated in the comment below.

"Use something instead of word 'delete studies' as we are just removing the studies from the selected studies and not deleting the study. (Replace word 'delete' by 'remove/unfollow'.)" [Participant 6]

Task 13: Deactivate one study (diabetes) from the followed studies.

Task Intuitiveness: 4.7
Ease of Learning: 4.8
Task Memorability :4.3

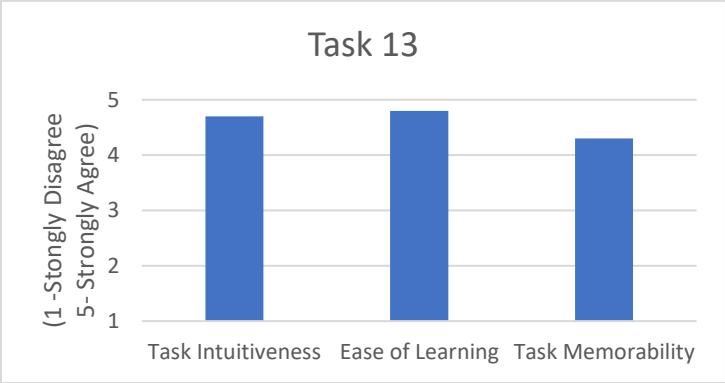

Figure 21. Task 13

Time on Task
Users required on average 17.38 seconds to complete this task.

Participants completed the task quickly compared to the average task time.

Task 14: View default notification preference. How you get your notifications?

Task Intuitiveness: 5.0
Ease of Learning: 5.0
Task Memorability: 5.0

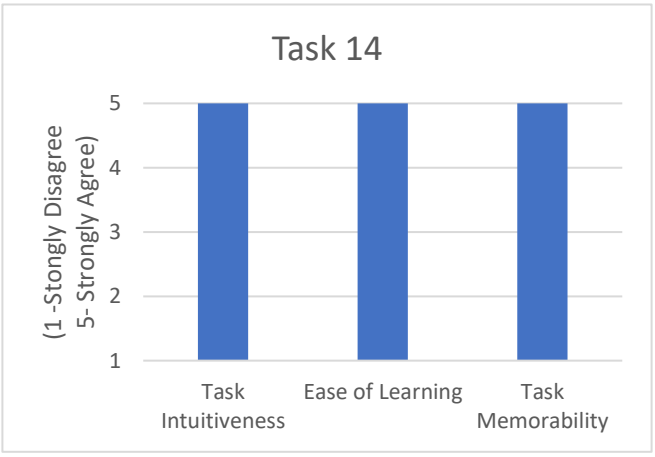

Figure 22. Task 14

Time on Task
Users required on average 36.81 seconds to complete this task.

Participants found this task very easy to complete and gave a very high rating in term of intuitiveness, learning and memorability.

Task 15: Select the option "Updates by email only." What are the steps you will follow to select the preference of notifications as email only?

Task Intuitiveness: 5.0
Ease of Learning: 5.0
Task Memorability: 5.0

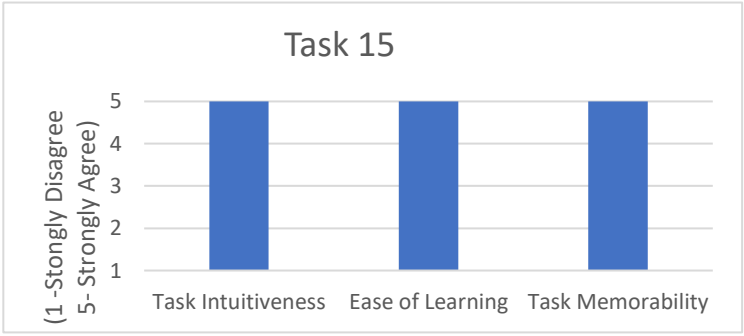

Figure 23. Task 15

Time on Task
Users required on average 29.42 seconds to complete this task.

This task got high ratings, similar to the previous task, and participants could complete it easily.

Task 16: Select the option that will give you updates when a new article is published. What are the steps you will follow to get updates?

Task Intuitiveness: 5.0
Ease of Learning: 5.0
Task Memorability: 4.7

<u>Time on Task</u>
Users required on average 28.65 seconds to complete this task.

Participants could complete this task easily. There was only one participant who was confused between certain terms used in this section. See the quote below.

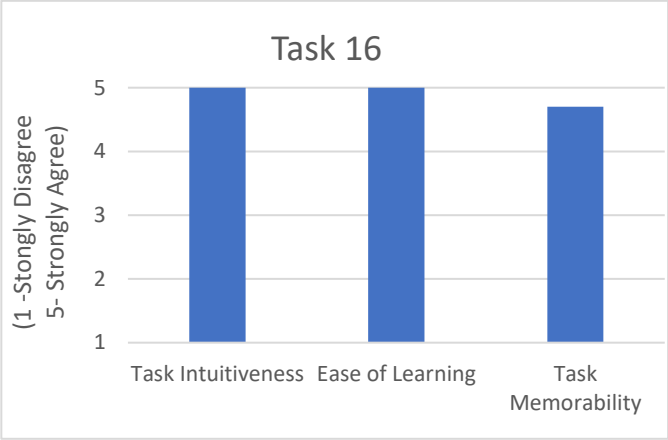

Figure 24. Task 16

"I was not sure between 'published article' versus 'internal report.'" [Participant 8]

Task 17: Get education material on the topic of diabetes. View educational material from MedlinePlus on the topic of diabetes.

Task Intuitiveness: 4.1
Ease of Learning: 4.9
Task Memorability: 4.3

<u>Time on Task</u>
Users required on average 52.05 seconds to complete this task.

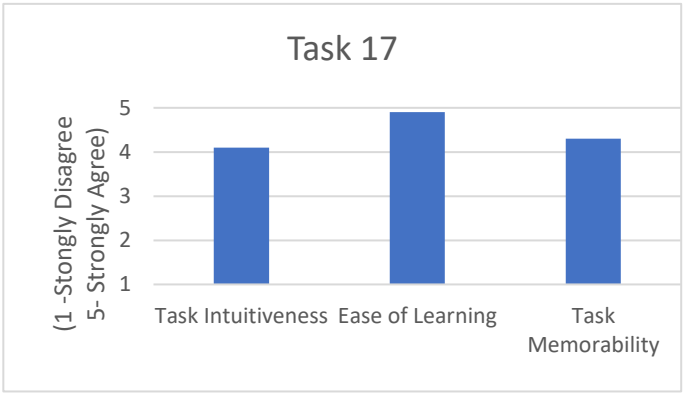

Figure 25. Task 17

This task took more time than average of 40.26 secs to complete the task. Also, some participants rated it lower in intuitiveness and memorability, which can explained by the comments below. Participants found it difficult to guess where that information might be. They were not able to easily find the education materials as there was no clear section or labelling for it.

"*I found it difficult to find it because I would not have anticipated this if I would not have been on that page." [Participant 8]*

"I found the task of finding educational material on a topic frustrating. For [example], diabetes. There was really no indicator on the section being educational material and [it] was very confusing." [Participant 4]

Task 18: Select the option that will give you an update on study status. Example: if there is change in status from "recruiting" to the study being completed.

Task Intuitiveness: 4.6
Ease of Learning: 5.0
Task Memorability: 4.6
Time on Task
Users required on average 26.17 seconds to complete this task.

Participants completed this task easily. They could easily find the section and complete the task; however, one participant was not sure about what was the purpose of study status, as is clear from the comment below.

"I was not 100% sure about the study status or what it does but it is easy to find." [Participant 6]

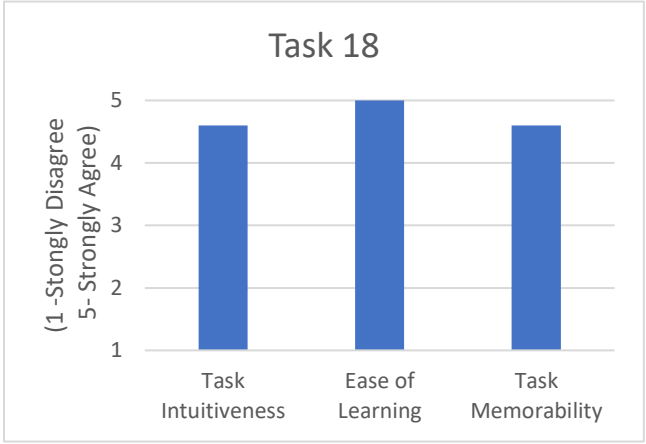

Figure 26. Task 18

Task 19: Select the option that will give you updates on data requests and when a new researcher has requested a study.

Task Intuitiveness: 4.9
Ease of Learning: 5.0
Task Memorability: 4.9

Time on Task
Users required on average 21.41 seconds to complete this task.

Participants completed this task easily and rated the task high in intuitiveness, learning and memorability factors.

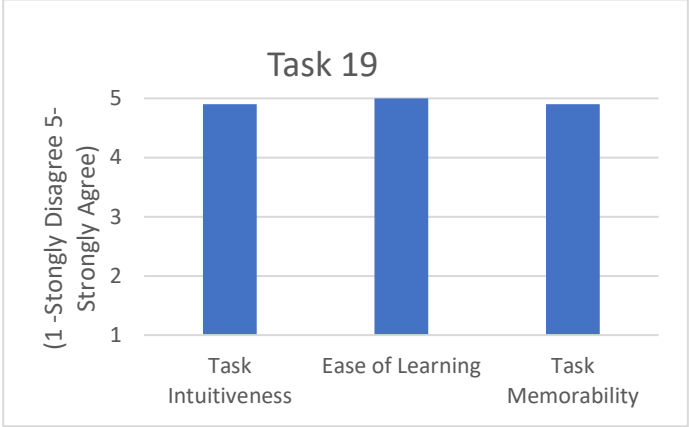

Figure 27. Task 19

5. DISCUSSION AND RECOMMENDATION

5.1. Summary of findings and recommendations from task analyses:

Overall the YGG Web portal was rated high in terms of intuitiveness, learnability, memorability, and overall usability. The usability study helped discover some minor issues and areas which, if addressed, can help further improve the user experience of the YourGiftGives Web portal. The expert reviewer study participants provided recommendations for a subset of the issues identified by task analyses. In some cases, recommendations were also provided when giving feedback during the post-questionnaire portion of the study. These are summarized below:

- **Issue:** Participants were getting confused trying to follow specific studies.

  (**Task 9:** Follow a study on diabetes using the web portal. Describe and perform the steps to follow the study.)

  "It was not immediate[ly] clear on how to follow but [I] was able to find out using trial and errors". [Participant 3]

  "It would be nice to label the checkbox in 'Follow studies.' That will be [an] improvement because some of them may not know what that checkbox means." [Participant 6]

  Recommendation: Have a separate tab for study preferences. [Participants 2, 4, and 8]

- **Issue:** Participants were confused by the "change password" task.

  (Task 6: Change the password of the Web portal. How would you do that?)

  "The arrangement and the wording seem to be confusing. It should use labels as 'old password' and 'new password' instead of 'password,' or you can put [the] old password on [the] left and [the] new password on [the] right side" [Participant 1]

  "[The] old password is at the bottom. I suggest [putting] the label 'new password' instead of 'password' in order to reduce confusion and frustration." [Participant 8]

Recommendation: Rename/relabel the section to distinguish between the old password and new password. [Participant 8]

- **Issue:** Participants found it difficult to find information about studies.

  (**Task 17:** Get education material on the topic of diabetes. View educational material from MedlinePlus on the topic of diabetes.)

  "What was frustrating was getting educational material on diabetes. There was really no indicator on the section being educational material and [it] was very confusing" [Appendix 4: Participant 4]

  Recommendation: Create a separate tab for all education materials [Participants 2, 4, and 8]

- **Issue:** Participants needed more information about the "Why sign up?" section.

  (**Task 1:** You are on the YourGiftGives (YGG) Web portal homepage. View information on the "Why sign up?" section of the homepage and provide feedback.)

  "I was confused a bit reading the information and was unsure about [the] signup section" [Participant 8]

  "I would appreciate a little more information on the 'Why sign up?' page." [Participant 10]

  Recommendation: Provide more information with easy-to-understand examples. [Participant 10]

- **Issue:** Although the portal was highly rated, some participants suggested the labeling and location of various sections could be improved.

  "Things that frustrated [me] most about this were [that] it didn't always make sense where things were located, [and I] need more explanation where links would be leading to." [Participant 6]

  Recommendation: Provide breadcrumbs and conduct a card sort exercise for better labeling and placement of different sections. [Participant 2, 3 & 6]

5.2. Summary of findings and recommendations from SUS analyses:

The participants rated the usability of YourGiftGives high as shown by the high System Usability Scale rating. The average SUS score was 85.5, which is well above the industry average of 68. Although the usability was high there were some issues discussed above which, if addressed, might improve the user experience even further.

5.3. Reflection on benefits and limitations to using expert reviewers for usability testing:

Expert reviewers helped us in gathering detailed feedback. They not only provided feedback on using the YGG Web portal but also enabled identifying usability issues encountered while they were completing the tasks. The expert reviewers also provided great suggestions and recommendations on how to solve issues.

Two panelists recruited from UserTesting.com were excluded from the analysis as they did not complete the study. The 10 panelists whose data were analyzed were effective as expert reviewers because they could understand the usability study well and were familiar with the UserTesting.com platform. Because of this, even though the YGG Web portal was new to them, they did not struggle with getting started with the study and jumped right into thinking aloud to provide quality feedback. They could understand and follow the instructions well even when the tasks were sometimes complex.

Although UserTesting.com panelists were great expert reviewers for this usability study, some of the key drawbacks were the cost of using the UserTesting.com platform, which might affect some studies if they require recruiting a large number of panelists. Also, the panelists may lack domain knowledge for some software or websites that have a very focused user base or require specific background. Further detailed studies would be needed to measure the actual impact of expert reviewers versus ordinary participants in usability studies. For our study, it worked well and we got good feedback along with some recommendations to help improve the user experience of the YGG web portal.

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APPENDIX

Appendix 1. Post-task survey.
Question 1 is a measure of intuitive design, question 2 is a measure of ease of learning and question 3 is a measure of memorability.

1. I found it easy to find the information I was looking for in the Web application. [Rating scale: strongly disagree to strongly agree]
2. I found it easy to keep track of where I was in the Web application [Rating scale: strongly disagree to strongly agree]
3. I could accurately predict which section of the Web application had the information I was looking for. [Rating scale: strongly disagree to strongly agree]

Appendix 2: Task template for UserTesting.com

Test Plan: An overview of the tasks and questions included in your test.

Introduction
Consider that you are a research volunteer and want to get updates on the ongoing studies in various field/diseases. Imagine you want to follow a study (ex. studies on diabetes, cancer, etc.) Imagine you want to get updates on recent study where you can select the frequency and ways of getting updates.

Tasks
1. Task 1: You are on the YourGiftGives (YGG) web portal homepage. Please read each section from the following task aloud and describe what you think. View information on the "Why sign up?" section of the homepage.
    - I found it easy to find the information I was looking for in the web portal [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point Rating Scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point Rating Scale: strongly disagree to strongly agree]
2. Task 2: You are on the YourGiftGives (YGG) web portal homepage. Please read each section from the following task aloud and describe what you think. View information on the "How it works" section of the homepage.
    - I found it easy to find the information I was looking for in the Web application. [5-point Rating Scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application [5-point Rating Scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point Rating Scale: strongly disagree to Strongly agree]
3. **Task 3:** You are on the YourGiftGives (YGG) web portal homepage. Please read each section from the following task aloud and describe what you think. View information on the "Who we are" section of the homepage.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]

- I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]

4. **Task 4:** Log into the YGG web portal using the following information. DO NOT CREATE UNIQUE CREDENTIALS. Email: user12@ygg.org Password: ygguser12
   - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
5. **Task 5:** Update your profile by changing the area code to 21212 using the Web portal. Hint: You have to log in to the Web portal in order to perform this task Username: user12@ygg.org and password: ygguser12. If you are already logged into the system you don't have to log in again.
   - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
6. **Task 6:** Change the password of the Web portal. How would you do that? Hint: old password: ygguser12. New password (password to be changed): yggusertwelve
   - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
7. **Task 7:** Re-verify whether you can successfully log into your YGG account using new password. Hint: You will have to logout from the system and try to log in using the newly created password. Username: user12@ygg.org. New password: yggusertwelve
   - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
8. **Task 8:** Follow a study on cancer using the web portal. Describe and perform the steps to follow the study. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
   - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
   - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
9. **Task 9:** Follow a study on diabetes using the web portal. Describe and perform the steps to follow the study. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.

- I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
- I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
- I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]

10. **Task 10 :** View the list of studies you are following on the YGG Web portal. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
11. **Task 11:** View the full study description of the followed studies on diabetes. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
12. **Task 12:** Remove the cancer study that you are following on the YGG Web portal. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
13. **Task 13:** Deactivate one study (diabetes) from the followed studies. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
14. **Task 14 :**View default notification preference. How you get your notifications? Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
15. **Task 15:** Select the option “Updates by email only.” What are the steps you will follow to select the preference of notifications as email only? Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.

- I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
- I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
- I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]

16. **Task 16:** Select the option that will give you updates when a new article is published. What are the steps you will follow to get updates? Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
17. **Task 17:** Get education material on the topic of diabetes. View educational material from MedlinePlus on the topic of diabetes. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
18. **Task 18:** Select the option that will give you an update on study status. Example: if there is change in status from "recruiting" to the study being completed. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]
19. **Task 19**: Select the option that will give you updates on data requests and when a new researcher has been requested a study. Hint: If you need to log into the system (Web portal) again, here are the credentials. Username: user12@ygg.org; password: yggusertwelve.
    - I found it easy to find the information I was looking for in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I found it easy to keep track of where I was in the Web application. [5-point rating scale: strongly disagree to strongly agree]
    - I could accurately predict which section of the Web application had the information I was looking for. [5-point rating scale: strongly disagree to strongly agree]

SUS Questions:

Thank you for your participation! These next questions are about the webpage overall.

1. I think that I would like to use this Web application frequently. [5-point rating scale: strongly disagree to strongly agree]
2. I found the Web application unnecessarily complex. [5-point rating scale: strongly disagree to strongly agree]

3. I thought the Web application was easy to use. [5-point rating scale: strongly disagree to strongly agree]
4. I think that I would need the support of a technical person to be able to use this Web application [5-point rating scale: strongly disagree to strongly agree]
5. I found the various functions in this Web application were well integrated. [5-point rating scale: strongly disagree to strongly agree]
6. I thought there was too much inconsistency in this Web application. [5-point rating scale: strongly disagree to strongly agree]
7. I would imagine that most people would learn to use this Web application very quickly. [5-point rating scale: strongly disagree to strongly agree]
8. I found the Web application very cumbersome to use. [5-point rating scale: strongly disagree to strongly agree]
9. I felt very confident using the Web application. [5-point rating scale: strongly disagree to strongly agree]
10. I needed to learn a lot of things before I could get going with this Web application. [5-point rating scale: strongly disagree to strongly agree]

Written Response Questions:

1. What frustrated you most about this site?
2. If you had a magic wand, how would you improve this site?
3. What did you like about the site?
4. How likely are you to recommend this site to a friend or colleague (0=Not at all likely; 10=Very likely)?

Appendix 3: Test Specifications for Pass/Fail/Partial Success.

Sub-task 1.1: View information on the "Why sign up?" section of the homepage.
Description:
To make sure users can understand the information provided on the "Why sign up?" section of the homepage and able to navigate successfully.

Feature Pass/Fail Criteria:
Pass: If the user can successfully navigate and understand the site.
Fail: If the user is not able to successfully navigate and is unable to understand the site.
Partial success: If the user is able to navigate but unable to understand.

Prerequisites
Access to Web portal
Setup
Test environment
Operation action
Access to the Web portal/website.
Expected result
User should be able to understand the purpose of the Web portal and should easily navigate.
Observed result
[add]
Pass/Fail

[Result after the test is conducted]
Severity ranking (Pick one if applicable)

•Critical: Unable to understand the purpose of Web portal.
•Major: Understanding somewhat related to YGG Web portal.
•Minor: Discrepancies that are not considered critical or major

Appendix 4: Written Response Questions (Responses from open-ended post-questionnaires)

Q1. What frustrated you most about this Web portal?

- I think that I did not necessarily know the proper terminology for studies, so searching for a specific study might be a challenge. *[Participant 1]*
- The study information being located under 'Notify preferences. *[Participant 2]*
- Not being successful changing my password. *[Participant 3]*
- What was frustrating was getting educational material on diabetes. There was really no indicator on the section being educational material and [it] was very confusing. *[Participant 4]*
- Nothing, I was very satisfied with the website *[Participant 5]*
- Lack of labeling of some buttons. *[Participant 6]*
- Didn't always make sense where things were located. *[Participant 7]*
- That 'Educational materials' was under 'Notification settings. *[Participant 8]*
- Nothing frustrated me about the site *[Participant 9]*

Q2. How would you improve this Web portal?

- More involved front page. The top of the page should be dominated by the text, and from what I experienced, the font was a little bit too small to be really engaging. *[Participant 1]*
- Move the study references to its own separate tabs under the main tabs such as 'Notify preferences' and 'Profile settings. *[Participant 2]*
- Organize research by field; ex. 'physical therapy. *[Participant 3]*
- Create a section of educational material and a section to subscribe *[Participant 4]*
- I do not see the need for any current updates *[Participant 5]*
- I would add labels to buttons and switches and add hyperlinks to important icons. *[Participant 6]*

- More explanation of what links were leading to. *[Participant 7]*
- Give a separate section for educational materials, getting general info. *[Participant 8]*
- I wouldn't really improve anything. It is simple and straight to the point, as it needs to be. *[Participant 9]*
- Larger text. *[Participant 10]*

Q3. What did you like about the Web portal?

- I loved how simple it was. I am a big fan of websites that serve a purpose. I would not want to be pestered with other information not pertaining to the topic I wanted to learn about. *[Participant 1]*
- It was very easy to use. *[Participant 2]*
- It's very simple; you do not need a technician to use this site, which will open up the site to a broad crowd of users. *[Participant 3]*
- Very use- friendly. *[Participant 4]*
- It's very simple, you do not need a technician to use this site, which will open up the site to a broad crowd of users. *[Participant 5]*
- Layout was very intuitive, font wasn't too small. *[Participant 6]*
- Fairly easy to use – not cluttered. *[Participant 7]*
- Consistency of buttons and banners and how easy it was to navigate. *[Participant 8]*
- Very clean, simple and overall works wonderfully *[Participant 9]*
- Easy to uses and many features. *[Participant 10]*

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SUMMARY

Health Information Technology experienced professional with demonstrated success in the field of public health informatics, user centered design and population health informatics. Strong interpersonal and multi-tasking skills, quick learner and detail oriented.

EDUCATION

Master's in Health Sciences Informatics Research August-2018

Johns Hopkins University, Baltimore, MD

Relevant course work: Health Information Technology: Design to deployment, HIT Standards and Systems Interoperability, Population Health Informatics, Clinical Informatics, Analysis of EHR, Database Querying in HealthCare, Health Information Systems, Digital Health.

Certificate in Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries December-2016

Bill and Melinda Gates and Bloomberg School of Public Health, Baltimore, MD

Bachelor of Engineering (BE), Information Technology May-2015

Savitribai Phule Pune University, India

Relevant course work: Software project Management, Software Engineering, Mobile Computing, Information Retrieval, Management Information System.

PROFESSIONAL EXPERIENCE

Intern within the Global Development Lab (USAID) April 2018-August 2018

USAID Project: mHero Learning retention study, Baltimore

- Measured retention rate of participants who received training through SMS improve knowledge, attitudes and skills following the training in case control study.
- Developed metrics with respect to the success rate of transmission (messaging), the accuracy of answering the quiz data, how many people responded to the quiz throughout the study.
- Managed, collected and analyzed data that will assist in future for educating the participant through SMS (mhealth) at the project site.

Research Associate - Automated Software Engineer Project March2017–August2018

Library Applications Group, Sheridan Libraries, Johns Hopkins University

- Created a pilot testing approach on Horizon Software Systems by doing research & evaluation and created test scenarios using appropriate testing tools.
- Presented findings to the IT team by meeting with librarian to observe and understand their workflow process.
- Designed and automated the testing script which helped in improving the efficiency of the team/software.

Information Technology Technician January 2014–January 2016

National Institute of Virology, Indian Council of Medical Research, Department of Health, Government of India, Pune, India

- Studied demographic characteristics and environmental condition for a population of 30,000 people and developed a Health and Demography surveillance software that has improvised data collection and maintenance.
- Coordinated with members of IT, clinical and field teams to understand their needs for developing the software, conducted workshops to train co-workers on using the newly developed software.

- Administered surveys to eligible people in the field study and gathered and integrated data from different sources/system.
- Assisted with the data management, prepared standard operating procedures (SOP), designed workflows, and helped Principal Investigator (PI) in analyzing data on surveillance study
- Collaborate with management and other stakeholders to implement and evaluate improvements.

Course Based Projects (Johns Hopkins University)

a) Assessing the usability of YourGiftGives(YGG) web portal with Biobank study participants (Advisor: Dr. Casey Overby, Ph.D.).

- Develop test plan and materials, administer usability analysis along with requirements gathering procedures.
- Conduct usability (heuristic) analysis, testing tools knowledge - with the lab setups and remote UX testing.

b) Evaluated the Boston Syndromic Surveillance System (B-SYNSS) using the Center for Disease Control and Prevention's (CDC) 2001 Guidelines for Public Health Surveillance Systems.

c) Designed clinical decision support system for "Pre-Surgical Identification and Anesthetic Management of the Non-Diagnosed Obstructive Sleep Apneic Patient (OSA)".

d) Evaluate the" Mobile Kunji (mhealth) application-Bihar, India" using the Informatics framework (PRISM and MAPS Toolkit).

PUBLICATION AND AWARDS÷

- Gavade Saurabh et al. **"**Automated Bluetooth Attendance Management System." International Journal of Computer Science Engineering and Information Technology Research (IJCSEITR) TRANS STELLAR Journal Publication, Apr. 2015.

PROFESSIONAL DEVLOPMENT

- **Language skills:** Fluent in English, Hindi, Marathi.
- **Computer Skills:** Proficient in Microsoft office, Microsoft Visio, Epi-info, SQL, Visual Basic, HTML, UFT, OpenMRS, SPSS, Rapidpro.
- **Training/Certification:**
    - Community based surveillance of viral disease syndrome by National Institute Virology workshop
    - Attended training sessions for Cloud Computing Championship, India.
    - HIPAA for Research
    - Electronic Information Security and Data Management Training – 2017
    - Responsible Conduct of Research (CITI)